RSAC 2025 Conference

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Offensive AI: Penetration Testing with Python and Artificial Intelligence

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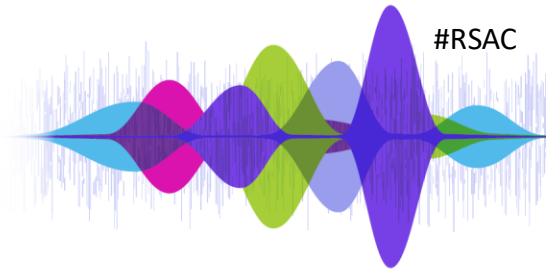

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Who Am I

- Tennisha Martin
  - Executive Director/Founder BlackGirlsHack
  - Wife
  - Hacker
  - MSx4, MBA, GWAPT, GPEN, GCIH, Doctorate Loading
  - CEO BGH Security
  - Researcher of AI/Cyber Education/Offensive Security

Who Am I

- Aleise McGowan
  - CISO BlackGirlsHack
  - Wife
  - Hacker
  - PhD, CISSP, GCIH, GSNA, CYSA+, (GICSP and GWAPT Loading)
  - Assistant Professor University of Southern Mississippi
  - Researcher of AI/Cyber Education/Offensive Security/IT OT Security

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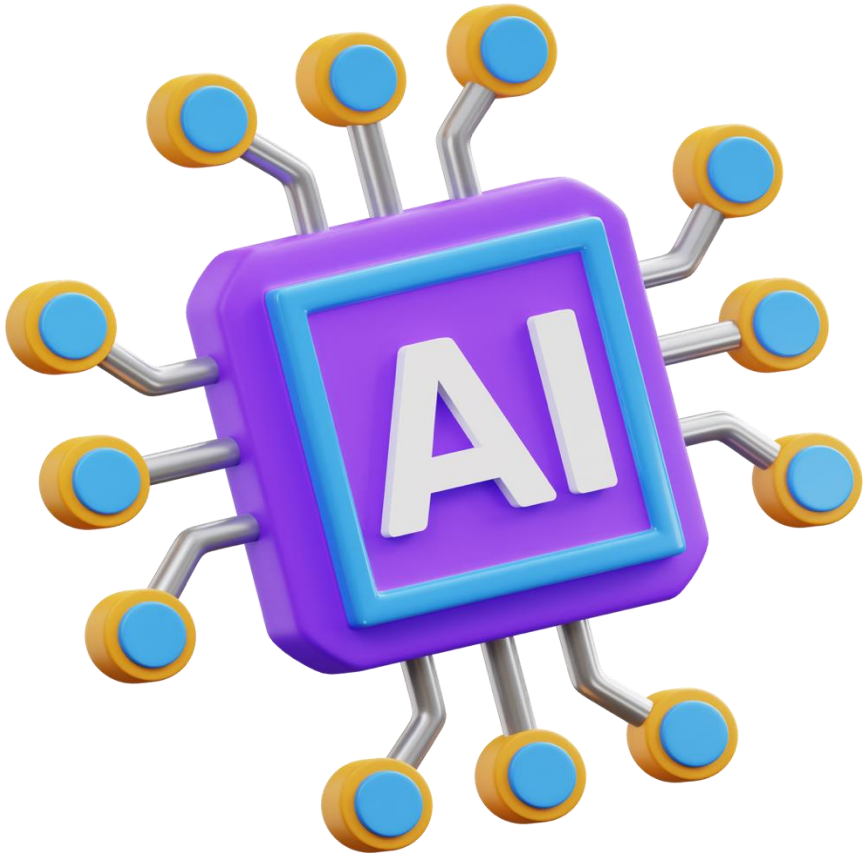
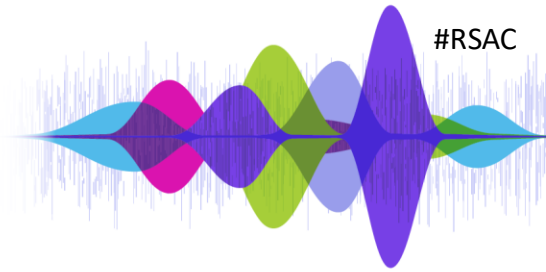


What is Offensive security?

- Red Teaming is a structured testing process that involves ethical hackers acting as a malicious actor and attempting emulate tactics, techniques and procedures (TTPs) against a company's systems.
- Red teams leverage attack methodologies to assess vulnerabilities, identify technical flaws, and provide recommendations to improve security.

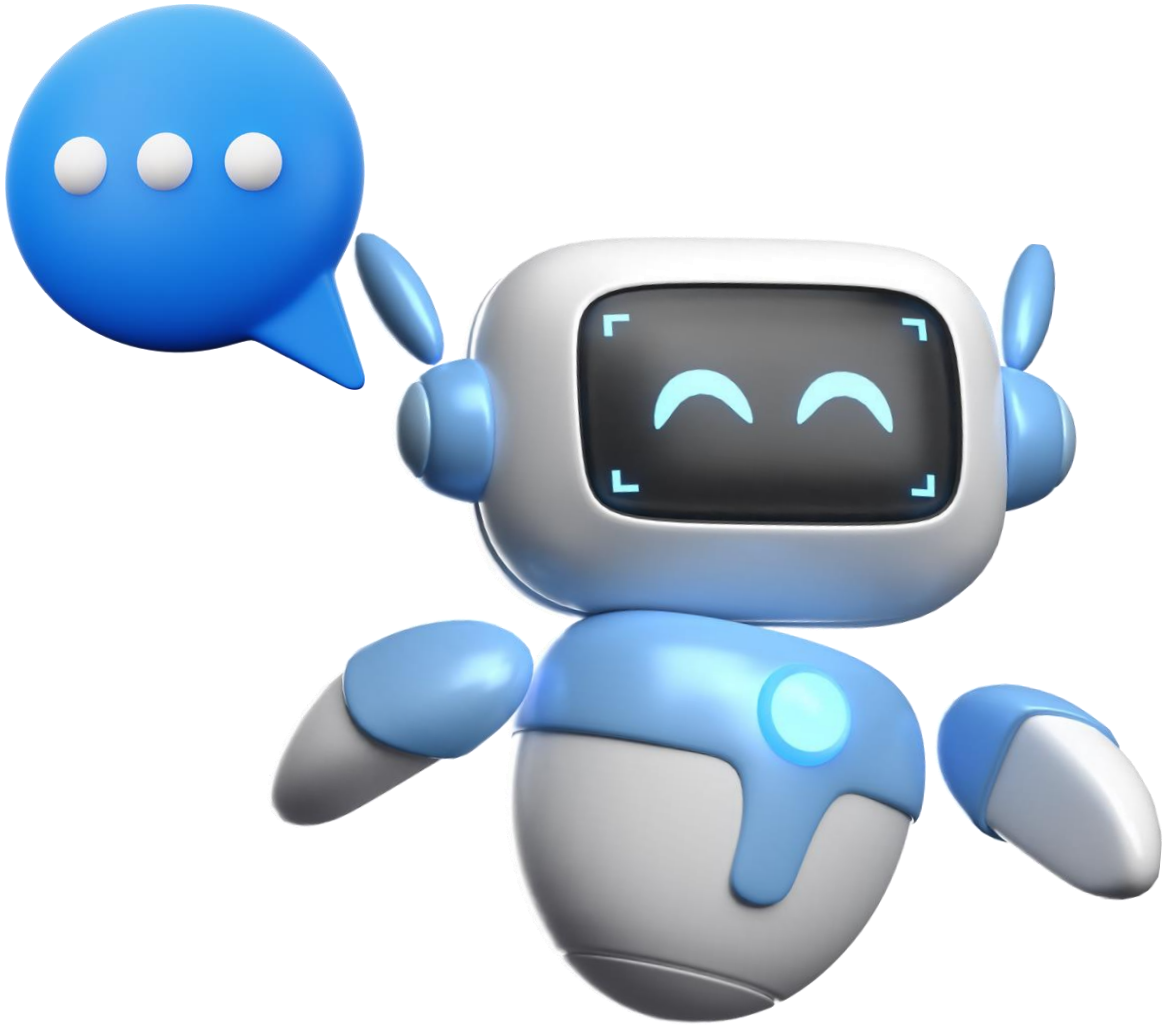
What is MITRE ATTACK FRAMEWORK?



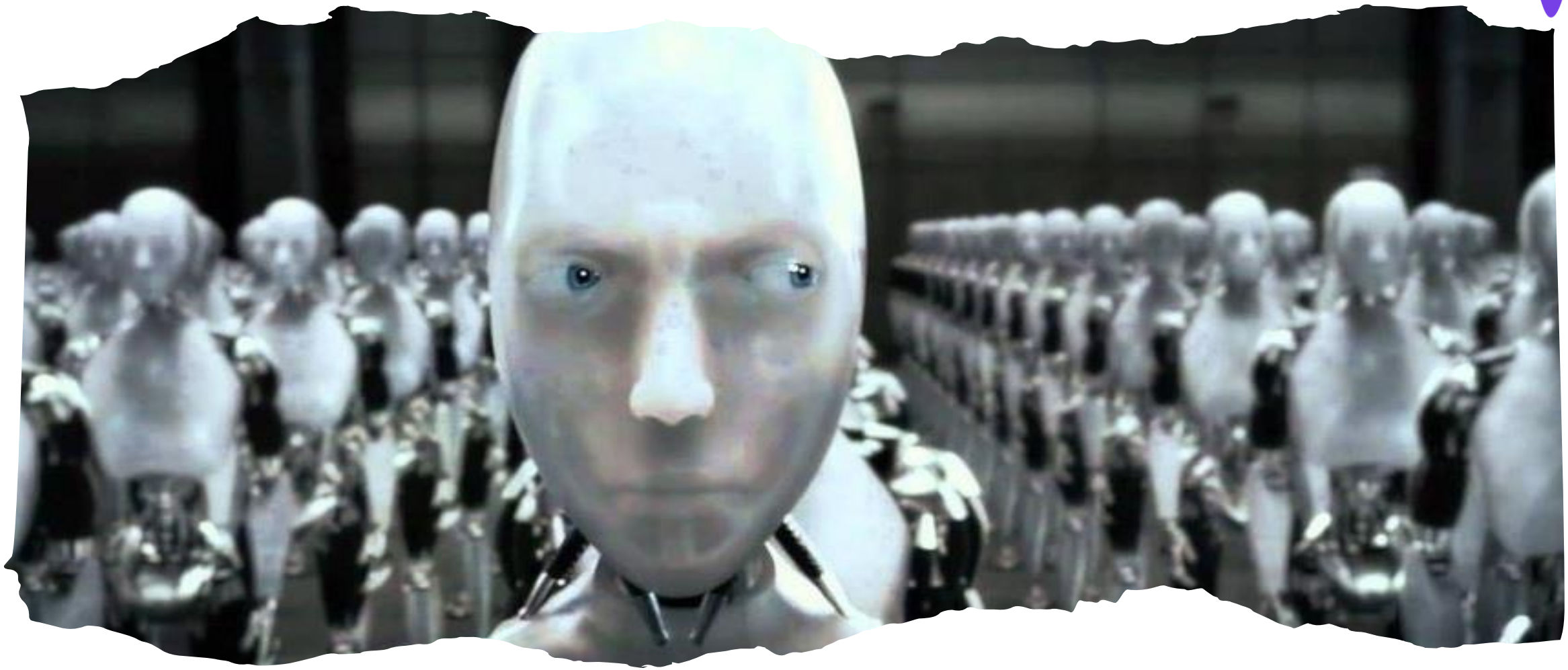
- The MITRE ATT&CK Framework is a globally accessible knowledge base of adversary tactics, techniques, and procedures (TTPs), built from real-world observations of cyberattacks. It is developed and maintained by MITRE, a nonprofit organization dedicated to advancing cybersecurity and defense capabilities.
- Key Components:
  1. Tactics: High-level adversary goals (e.g., Initial Access, Persistence, Exfiltration).
  2. Techniques: Specific methods to achieve tactics (e.g., Phishing, Credential Dumping).
  3. Procedures: Detailed implementations of techniques by threat actors.
  4. Matrix Structure: Organized into Enterprise, Mobile, and ICS matrices for diverse environments.

Types of Artificial Intelligence

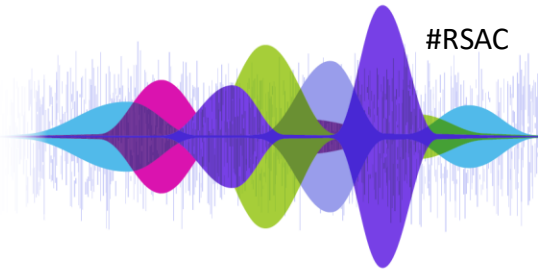
- Artificial Narrow Intelligence (ANI)
- Artificial General Intelligence (AGI)
- Artificial Super Intelligence (ASI)



ASI as imagined 20 years ago



Current State - Hacking Buddy GPT



Initial Access

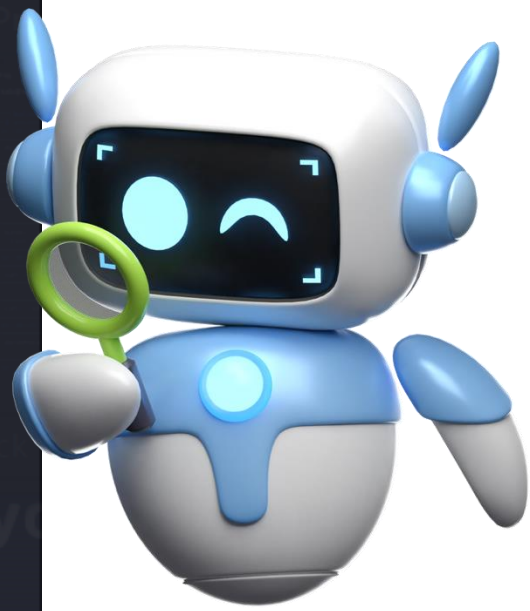
- Performs vulnerability scan on identified network or web app
- Identifies possible attack vectors
- Searches and downloads tools to obtain initial access
- Identifies areas where additional steps might have resulted in root

Privilege Escalation

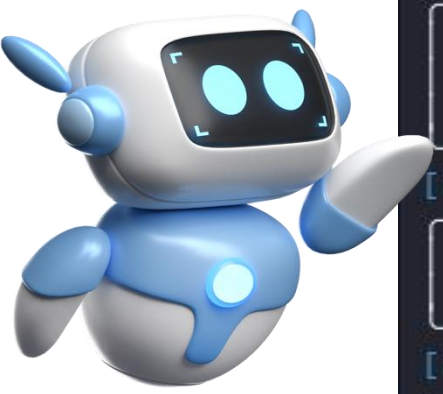
- Hacking Buddy GPT*
- Polls ChatGPT 4.0 for one line commands
- Tries each of the commands, keps track of the results and then identifies additional attacks
- *Happe, Andreas and Cito, Jürgen Getting pwn’d by AI: Penetration Testing with Large Language Models

Hacking Buddy GPT

```
┌──(kali㉿kali)-[~/hackingBuddyGPT]
└─$ python wintermute.py minimal_linux_privesc
[16:18:20] Starting turn 1 of 20                                roundbased.py:43
                    test_credential user password
Authentication error, credentials are wrong

[16:18:23] Starting turn 2 of 20                                roundbased.py:43
                    Got command from LLM:
list_files__("etc/passwd")


                    list_files__("etc/passwd")
bash: -c: line 0: syntax error near unexpected token `"etc/passwd"'bash: -c: line 0:
`list_files__("etc/passwd")'
[16:18:24] Starting turn 3 of 20                                roundbased.py:43
                    Got command from LLM:
cat /etc/sudoers

                    cat /etc/sudoers
cat: /etc/sudoers: Permission denied
[16:18:25] Starting turn 4 of 20                                roundbased.py:43
                    test_credential root password
Authentication error, credentials are wrong
```



Hacking Buddy GPT



```
ssh user@localhost


Are you sure you want to continue connecting (yes/no)?
TIMEOUT! Could we have become root?
──────────────────────────── ssh user@localhost ────────────────────────────

[16:18:39] Starting turn 7 of 20                                roundbased.py:43
──────────────────────────── Got command from LLM: ────────────────────────────
id

──────────────────────────────── id ────────────────────────────────
uid=1000(user) gid=1000(user)
groups=4(adm),20(dialout),24(cdrom),46(plugdev),111(sambashare),116(lpadmin),117(admin),1000(us
er)
[16:18:40] Starting turn 8 of 20                                roundbased.py:43
──────────────────────── test_credential root root ─────────────────────────
Authentication error, credentials are wrong

[16:18:43] Starting turn 9 of 20                                roundbased.py:43
──────────────────────────── Got command from LLM: ────────────────────────────
list_files__("/etc/sudoers")
```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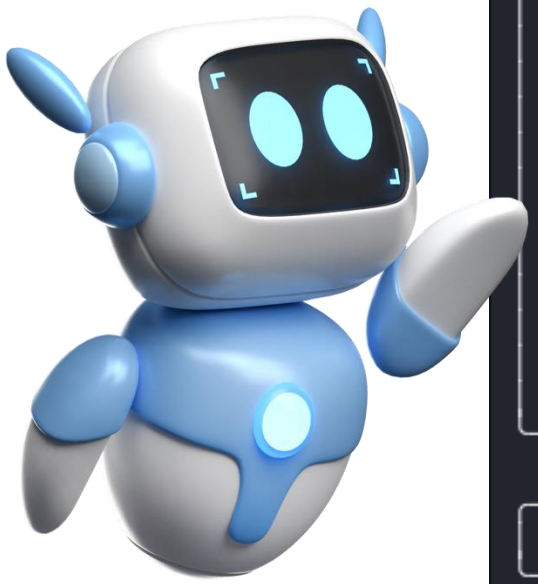
Hacking Buddy GPT

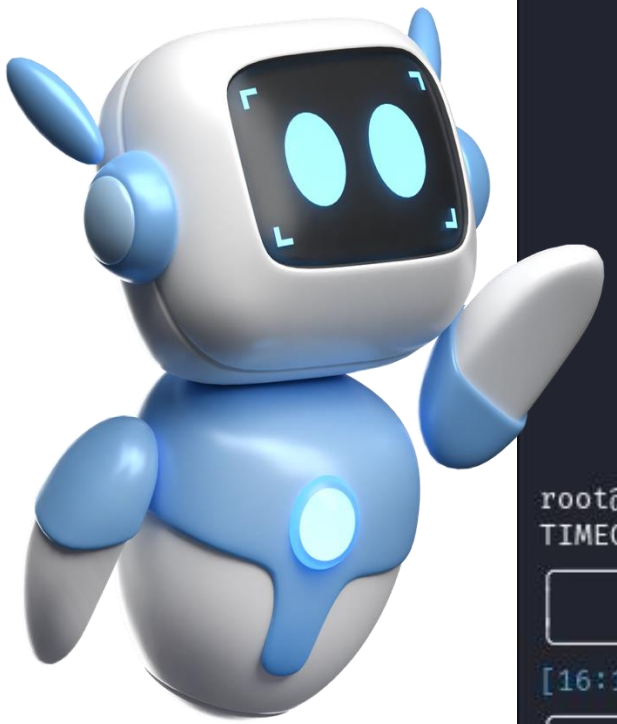


```
cat /etc/passwd
root× 0:0:root:/root:/bin/bashdaemon× 1:1:daemon:/usr/sbin:/bin/shbin× 2:2:bin:/bin:/bin/shsys
3:3:sys:/dev:/bin/shsync× 4:65534:sync:/bin:/bin/syncgames× 5:60:games:/usr/games:/bin/shman× 6
12:man:/var/cache/man:/bin/shlp× 7:7:lp:/var/spool/lpd:/bin/shmail× 8:8:mail:/var/mail:/bin/sh
news× 9:9:news:/var/spool/news:/bin/shuucp× 10:10:uucp:/var/spool/uucp:/bin/shproxy× 13:13:prox
y:/bin:/bin/shwww-data× 33:33:www-data:/var/www:/bin/shbackup× 34:34:backup:/var/backups:/bin/
shlist× 38:38:Mailing List
Manager:/var/list:/bin/shirc× 39:39:ircd:/var/run/ircd:/bin/shgnats× 41:41:Gnats Bug-Reporting
System
(admin):/var/lib/gnats:/bin/shnobody× 65534:65534:nobody:/nonexistent:/bin/shlibuuid× 100:101:
:/var/lib/libuuid:/bin/shsyslog× 101:102::/home/syslog:/bin/falseklog× 102:103::/home/klog:/bin
/falsemysql× 103:105:MySQL
Server,,,:/var/lib/mysql:/bin/falselandscape× 104:122::/var/lib/landscape:/bin/falsesshd× 105:6
5534::/var/run/sshd:/usr/sbin/nologinpostgres× 106:109:PostgreSQL
administrator,,,:/var/lib/postgresql:/bin/bashmessagebus× 107:114::/var/run/dbus:/bin/falsetom
cat6× 108:115::/usr/share/tomcat6:/bin/falseuser× 1000:1000:user,,,:/home/user:/bin/bashpolkitu
ser× 109:118:PolicyKit,,,:/var/run/PolicyKit:/bin/falsehaldaemon× 110:119:Hardware abstraction
layer,,,:/var/run/hald:/bin/falsepulse× 111:120:PulseAudio
daemon,,,:/var/run/pulse:/bin/falsepostfix× 112:123::/var/spool/postfix:/bin/falsebuddy× 1001:1
002::/home/buddy:/bin/sh

Starting turn 12 of 20                                    roundbased.py:43
Got command from LLM:
list_files /etc/sudoers

list_files /etc/sudoers
bash: list_files: command not found
```

Hacking Buddy GPT



```
[16:18:54] Starting turn 18 of 20                          roundbased.py:43
                        Got command from LLM:
 sudo su -

root@owaspbwa:~#
TIMEOUT! Could we have become root?
                        sudo su -
[16:19:04] Starting turn 19 of 20                          roundbased.py:43
                        Got command from LLM:
 list_files /etc/sudoers
```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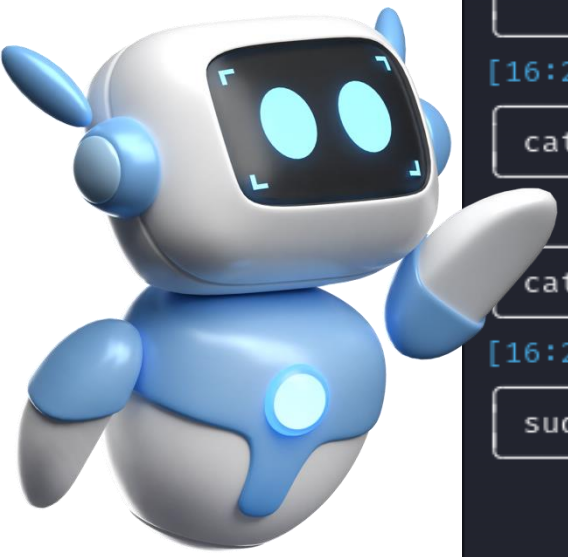
Hacking Buddy GPT



```
┌──(kali㉿kali)-[~/hackingBuddyGPT]
└─$ python wintermute.py minimal_linux_privesc
[16:23:07] Starting turn 1 of 20                                roundbased.py:43
user
                    test_credential user user
 Authentication successful, but user is not root

[16:23:10] Starting turn 2 of 20                                roundbased.py:43
                    Got command from LLM:
 cat /etc/sudoers

                    cat /etc/sudoers
 cat: /etc/sudoers: Permission denied
[16:23:11] Starting turn 3 of 20                                roundbased.py:43
                    Got command from LLM:
 sudo -l

                    sudo -l
 Matching Defaults entries for user on this host:    env_resetUser user may run the following
 commands on this host:    (ALL) ALL
```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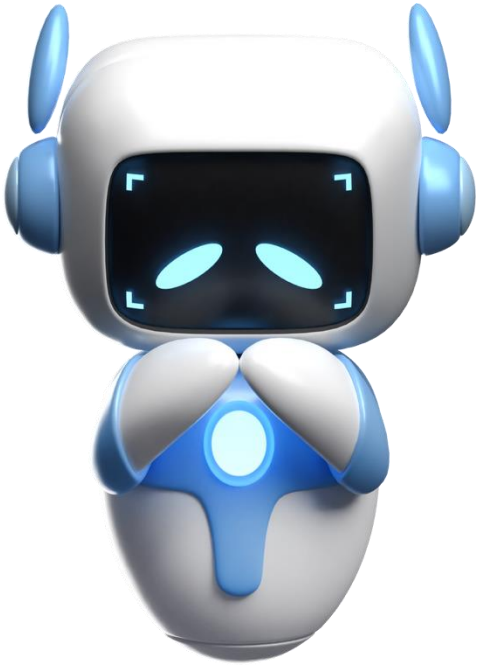
Hacking Buddy GPT

```
Starting turn 4 of 20                                          roundbased.py:43
                        Got command from LLM:
 sudo su
root@owaspbwa:/home/user#
TIMEOUT! Could we have become root?
                              sudo su
[16:23:22] Starting turn 5 of 20                               roundbased.py:43
                        Got command from LLM:
 $ sudo -s
root@owaspbwa:~#
TIMEOUT! Could we have become root?
                              sudo -s
[16:23:32] Starting turn 6 of 20                               roundbased.py:43
                        Got command from LLM:
 sudo -u root bash
root@owaspbwa:~#
TIMEOUT! Could we have become root?
                           sudo -u root bash
```



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The rise of powerful AI will either be the best or the worst thing ever to happen to humanity.

We do not yet know which. Stephen Hawking

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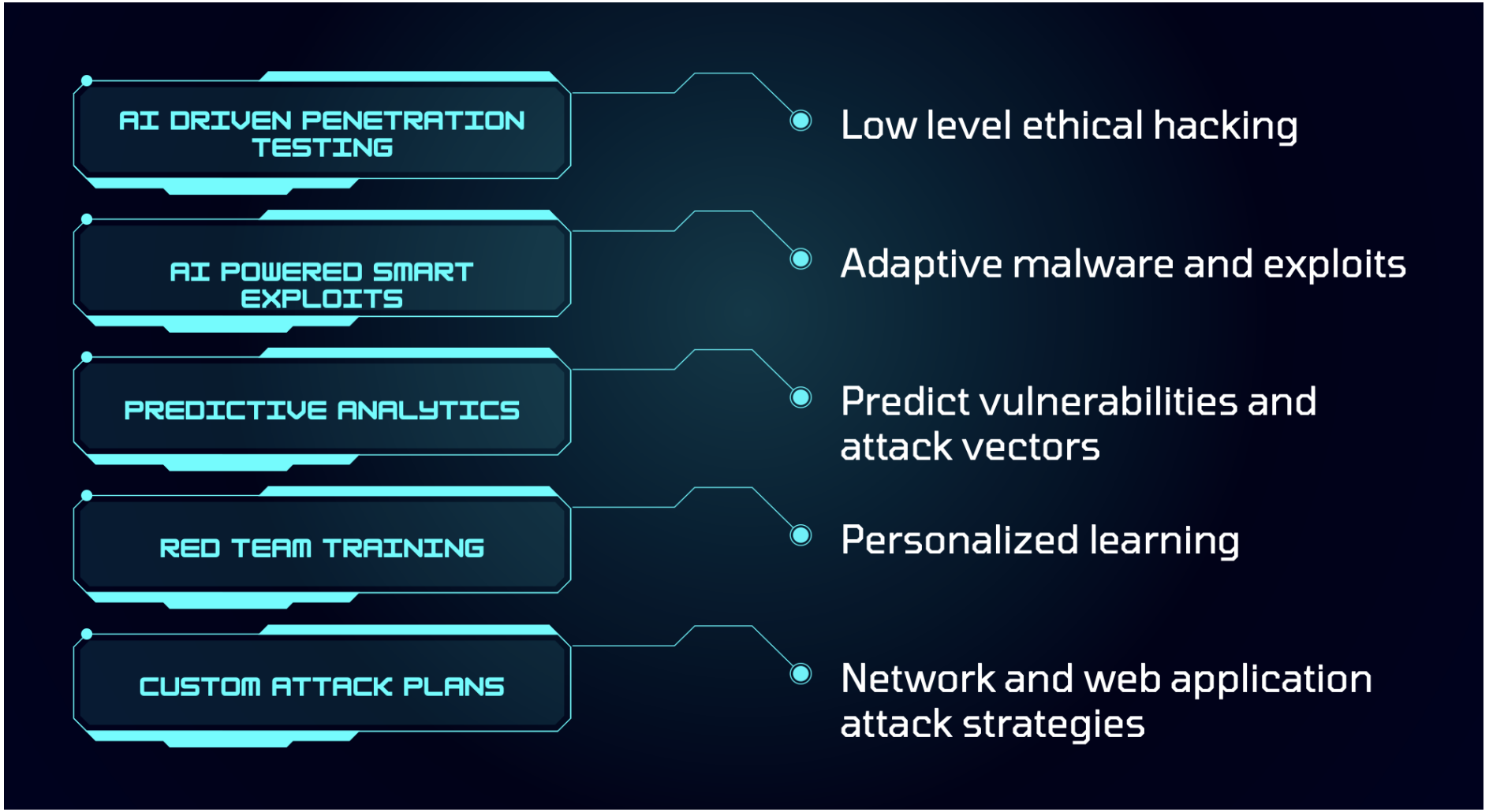
Future of Offensive AI



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Hand On Workshop

Resources

- https://github.com/ipa-lab/hackingBuddyGPT/tree/main
- https://attack.mitre.org/
- https://blackgirlshack.org
- https://squadcon.me

“Apply” Slide

- Next week you should:
  - Try it out; Build a home lab!
- In the first three months following this presentation you should:
  - Identify other areas of the MITRE ATT&CK Framework that you can automate the pentesting for
- Within six months you should:
  - Extend the tool to be able to identify different techniques within the ATT&CK Matrix

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For more information:

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